Getting Started Guide for the Small Arms Range Noise Assessment Model (SARNAM)

Larry Pater, Pamela Woof, Diane Rhoads, and Michael White

Realistic training for soldiers includes firing weapons at small arms ranges on military installations. Noise from these ranges can annoy people living in the surrounding area. In an effort to preserve this critical training, installations having ranges must conduct an evaluation of community noise exposure and develop a plan to minimize annoyance to local residents.

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This guide contains instructions for the steps needed to create and run a typical case file.

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Realistic training for soldiers includes firing weapons at small arms ranges on military installations. Noise from these ranges can annoy people living in the surrounding area. In an effort to preserve this critical training, installations having ranges must conduct an evaluation of community noise exposure and develop a plan to minimize annoyance to local residents.

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Foreword

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Distribution

1 Introduction

Purpose

The Small Arms Range Noise Assessment Model (SARNAM) is a tool that enables you to draw noise contours and assess community noise impact for small arms ranges. This tool will be useful to all military services and operators of law enforcement training ranges and recreational shooting ranges. A tool that accurately predicts small arms range noise impact is essential for the planning, siting, and design of new ranges and for operational noise management planning for existing ranges.

This guide is designed to get you started by taking you through the steps to create a typical case file. You will define a case file, create all the records necessary, and run the case file.

Point of Contact

The U.S. Army Construction Engineering Research Laboratory (CERL) developed SARNAM Version 2.0, Small Arms Range Noise Assessment Model at Champaign, Illinois.

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2   What is a Case File?

To calculate and plot a noise contour for a small arms range you must build a case file. To build a case file you must make three selections, a Receiver Grid, a Metric, and an Activity. These three selections are made on the SARNAM Main form.
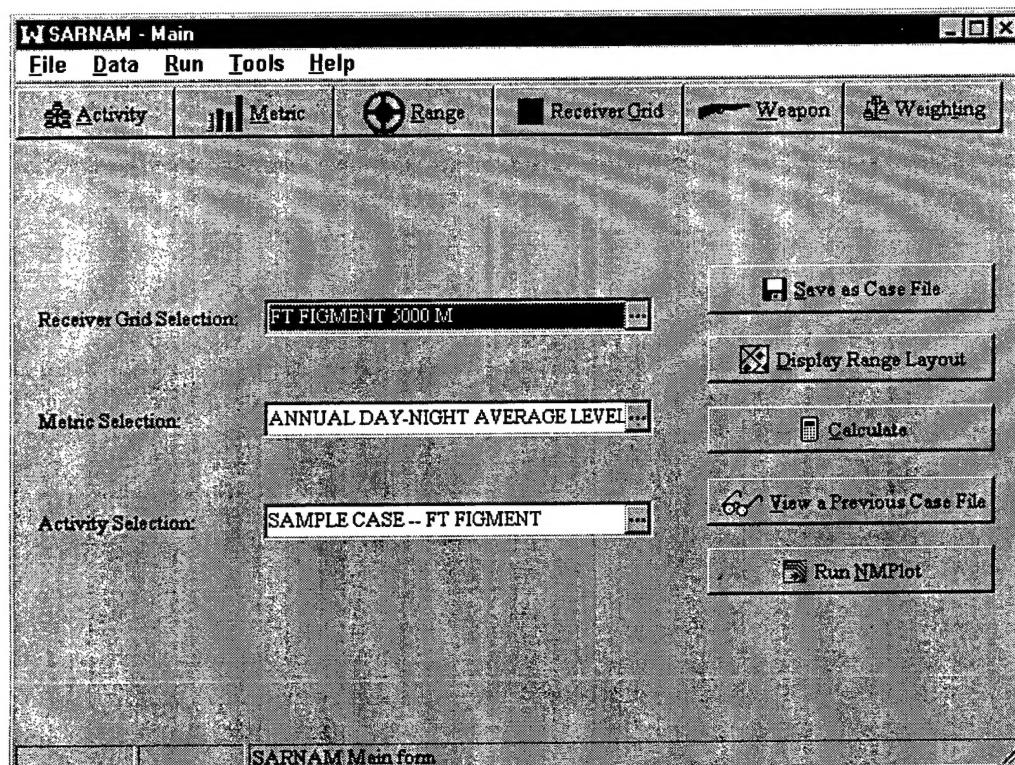
SARNAM Main form.

Receiver Grid Selection

The Receiver Grid defines a two-dimensional plan-view region over which noise contours are plotted. If you are running SARNAM for the first time, this list is empty.

Metric Selection

Your Metric selection specifies noise measurement parameters, penalties, and assessment procedures that will be used in the calculations. These will affect calculated noise contour values. SARNAM includes 3 commonly used Metric selections in the database:

1. Annual Day-Night Average Level (DNL)
2. Annual Equivalent Continuous Level (LEQ)
3. Sound Exposure Level (SEL)

Activity Selection

The Activity selection defines an operation occurring on a small arms range or group of ranges. Each Activity has several Activity Details. The Activity Detail record includes the Range, the Weapon, and the number of rounds fired. If you are running SARNAM for the first time, the Activity list is empty.

3 Entering a Sample Case File

General Information

Only three selections are required to form a case file (Receiver Grid, Metric, and Activity), but these three selections include several other records. For example, a Weighting record is part of the Metric selection. An Activity record includes several Detail records. An Activity Detail record includes the selection of the Ranges on which the Activity takes place and Weapons used.

We will use a Receiver Grid, FT FIGMENT 5000 M, and a Metric, ANNUAL DAY-NIGHT AVERAGE LEVEL (DNL), and the Activity, SAMPLE CASE – FT FIGMENT, to create the sample case file. This requires the creation of a receiver grid record, FT FIGMENT 5000 M; four ranges, ALPHA, BRAVO, CHARLEY, and DELTA; one Activity, and seven Activity Detail records. Metric (which includes Weighting) and Weapon records that already exist in the SARNAM database will be used.

Opening forms

You can open all SARNAM forms in three ways. For example to open the Range form, (1) use the pull down menu to select **Data | Range**, (2) click on the button labeled **Range**, or (3) use the right click menu and select **Range**.

Navigation

SARNAM incorporates several methods to move from field to field. These methods include the use of the **TAB** key, **ENTER** key, Mouse, or Hot Keys. For example, on any of the data entry forms, pressing the key combination of **Alt + N** is the same as clicking on **New,** which is the same as pressing **ENTER** when **New** is highlighted.

Creating

To enter a new record select **New.** Enter the required data then click **Save.**

Copying

If the information you wish to enter in the new record is similar to the existing record, select the existing record in the lookup or drop down list then click **Copy**. Enter or change data as required then click **Save**.

Editing

To edit a record, simply click **Edit**. If there are no records, or if the selected record is locked (the word "locked" is displayed in the status bar), this option will not be available. If you wish to edit a record that is not currently displayed, select the desired record from the lookup or drop down list. Click **Edit**, make the desired changes, then click **Save**.

The Metric, Weighting, and Weapon records that are provided in the SARNAM database are locked, you cannot edit them. You may however modify a copy of them. Select the locked record that you wish to modify. Click **Copy**. Change the name and any values. Click **Save**.

When creating a new record or editing an existing record, some fields must have valid values. If any required fields are empty or special fields do not have valid values, you will not be able to save the record until these problems are resolved.

Entering Data

Defining a Receiver Grid
1. Open the Receiver Grid form.
2. Click **New**.
3. Enter the data for the Receiver Grid as shown. (See next page.)
4. Click **Save**.
5. Click **Exit**.

Defining a Range

The Sample Case requires you to define four ranges. To enter the first range:
1. Open the Range form.
2. Click **New**.
3. Enter the data for the range ALPHA as shown. (See next page.)

H SARNAM - Receiver Grid

New	Copy	Edit	Cancel	Save	Help
Delete	Import	Export	Print		Exit

Receiver Grid Name: `FT FIGMENT 5000 M|`   All Distances in Meters

UTM Zone: `16`   Overall East-West Grid Size: `5000`

Easting Coordinate: `400000`   Overall North-South Grid Size: `5000`

Northing Coordinate: `4450000`   Grid Mesh Spacing (Both Directions): `50`

Created: 28 Jul 1998   Last Modified: 12 Aug 1998

Remarks:

`This is a 5000 meter square receiver grid area, used for a`

Sorting Information

Installation Name: `FT FIGMENT`   Load Default

Service: `US ARMY`   Save Default

State: `IL`   Country: `USA`   Author: `MAJ PROBLEM`

Editing

Receiver Grid.

H SARNAM - Range

New	Copy	Edit	Cancel	Save	Help
Delete	Import	Export	Print		Exit

Layout | Barriers & Baffles |

Range Name: `ALPHA`   ...   All Distances are in Meters

Range Layout

UTM Grid Zone Number: `16`   FP and Target Elevation: `1`

Easting Coord. of FP #1: `402000`   Distance from FP to Target: `300`

Northing Coord. of FP #1: `4452000`   Number of Lanes: `30`

Grid Azimuth from   `0`   Spacing Between FPs: `5`
FP to Target:

Created: 28 Jul 1998   Last Modified: 3 Mar 1999

Sorting Information

Installation Name: `FT FIGMENT`   Load Default

Service: `US ARMY`   Save Default

State: `IL`   Country: `USA`   Author: `MAJ PROBLEM`

Range form, page 1 ALPHA.

Note: If you click **Save** before you have entered all the information, you must click **Edit** to continue entering or changing data.

4. Click **Save Default**.

   Since the Sorting Information is entered into several records, using **Save Default** will save these values for later use.

5. Click the tab **Barriers & Baffles**.

   This screen is divided into several sections. Each section has several available values that are based on the type of barrier you select. Click on Type in the Target Backstop section. The current value is NONE. Select BERM. The fields Backstop Height and Distance Behind Targets become enabled.

6. Continue to enter the information as shown. (See figure.)

7. Click **Save**.

Range form, page 2 ALPHA.

Range ALPHA has now been entered and saved.

You need to enter three more ranges for the sample case. Since most of the information is similar, the copy function can be used. Click **Copy**. For each range, change the data as shown in Table 1. Click **Save**. After you enter and save all range data, click **Exit**.

Table 1. Sample case range data.

Range Name	UTM Grid Zone	Easting Coord.	Northing Coord.	Grid Azimuth	FP and Target Elevation	Distance from FP to Target	Number of Lanes	Spacing Between FPs
BRAVO	16	402500	4452000	0	1	25	6	5
CHARLEY	16	402700	4452000	0	1	25	25	3
DELTA	16	403200	4452000	90	1	300	3	10
Same for All Ranges:	Installation Name	Service	State	Country	Author	Barriers and Baffles		

Defining an Activity

First you must define an Activity and the Activity Details. Both the Activity and the Activity Details are defined on the Activity form. The first page (Activity Overview) defines the Activity. The second page (Assign Activity Details) defines all the details of this activity. To define the Activity:

1. Open the Activity form.
2. Click **New**.
3. Enter the name for the activity.
   For this sample case, the activity is FT FIGMENT 5000 M. (See next page.)
4. Click **Load Defaults.**
   This will enter all the sorting information that was saved from the Range data.
5. Click **Save**.

The Activity has now been defined.
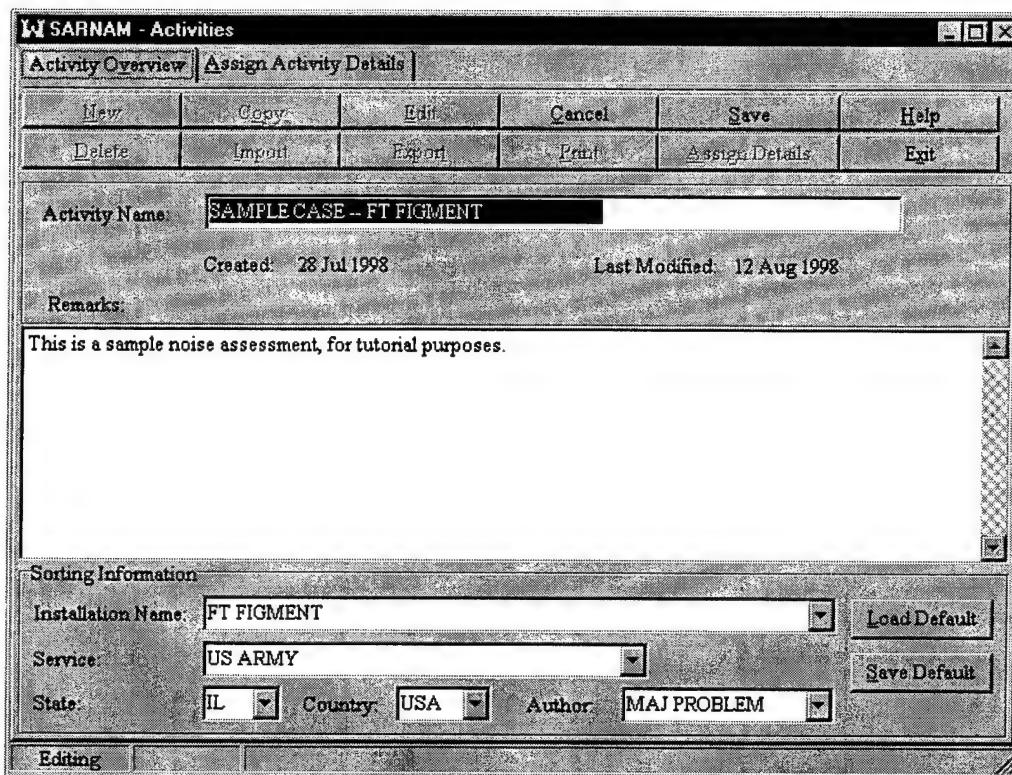
Activity form, Activity Overview page.

Defining Activity Details

Since you have just defined an Activity, its name is selected. When you move to the Activity Details page you will see only the Activity Details that belong to this Activity.

Click the Assign Activity Details tab. You are now ready to enter the detail records for this activity.

For each activity detail, follow these steps:
1. Click **New**.
2. Select the Range Name from the lookup list of previously entered Ranges.
   There are several options to select the range. First you may click on the field and the list of available ranges will pop up. Click on the desired range name then click **OK** or just double click on the desired range name. If you already know the name of the range, type the name. The lookup list will pop up and automatically search for the name as you are typing. When the desired name is highlighted, press **Enter**.

Activity form, Assign Activity Details page (first record for Range ALPHA).

3. Select the Weapon in a similar manner.
    The Weapons are in a drop down list but the method of selection is similar. You did not enter any new weapons for the sample case file. You are using weapons that are already included in SARNAM.

4. Enter the remaining data (# Day Rounds, # Night Rounds, % Day Rapid Fire, % Night Rapid Fire). Rapid fire is defined as an aggregate firing rate greater than 30 shots per second.

5. Click **Save**.

6. Repeat steps 1-5 for each of the Activity Detail records, using the data in Table 2. When you finish entering all seven Activity Details records, SARNAM contains all the data necessary for the sample case.

7. Click **Exit**.

Table 2. Sample activity detail data.

Range Name	Weapon	# Day Rounds	# Night Rounds	% Day Rapid Fire	% Night Rapid Fire
ALPHA	RIFLE M16 / 5.56 MM M193	250000	0	0	0
ALPHA	RIFLE M14 / 7.62 NATO	30000	0	0	0
ALPHA	SAW M249 / 5.56MM M193	100000	0	50	0
BRAVO	RIFLE M16 / 5.56 MM M193	25000	0	0	0
CHARLEY	PISTOL 9MM AUTO / PARABELLUM	100000	0	0	0
CHARLEY	PISTOL .45 CAL AL / .45 ACP	20000	0	0	0
DELTA	MG M60 / 7.62 NATO	10000	0	20	0

4   Calculating a Case File

Making the Selections

The Case file selections can be made only after all the data has been entered.

Receiver Grid Selection
1.   Click on the Receiver Grid Selection.
2.   Select FT FIGMENT 5000 M from the lookup list.

Metric Selection
1.   Click on the Metric Selection.
2.   Since we are using a predefined metric for the sample case, select ANNUAL DAY-NIGHT AVERAGE LEVEL (DNL) from the lookup list.

Activity Selection
1.   Click on the Activity Selection.
2.   Select SAMPLE CASE -- FT FIGMENT from the lookup list.

Run the Case File

After you have made the three selections, Receiver Grid, Metric, and Activity, you are ready to run the Case File.
1.   Click **Calculate**.
2.   Click **Yes** or **No** when asked if you want to save the case file.
     If you have already saved these three selections as a case file, you do not need to save the file again; click **No**. If you have not already saved it or if you have made changes in any of the contributing files (Ranges, Activity Details, etc.) since your last save, click **Yes** to save it now. Whether you choose to save or not, SARNAM must write the case file again.
3.   Wait while the calculations are performed.
     This may take some time (about 8 minutes on a 333 machine). A gauge is provided to show the progress.

4. View the results in NMPlot.

   After the calculations are finished, SARNAM will automatically open NMPlot with your calculated case.

   SARNAM includes NMPlot v4.3 as the plotting application. A default configuration file is also included. If you wish to change any configuration parameters, go to **Plot |** **Options**. At the time of this writing, NMPlot has no on-line help. For more NMPlot information visit http://www.wasmerconsulting.com/nmplot.htm.

5. Save the NMPlot file.

   Choose a different name for the NMPlot file. Do not use SARNAM.nmp. SARNAM.nmp is deleted and rewritten each time a case file is run. Go to **File |** **Save as**. Enter FIGMENT.nmp.

6. Close NMPLot when you are done viewing.

7. Close SARNAM.
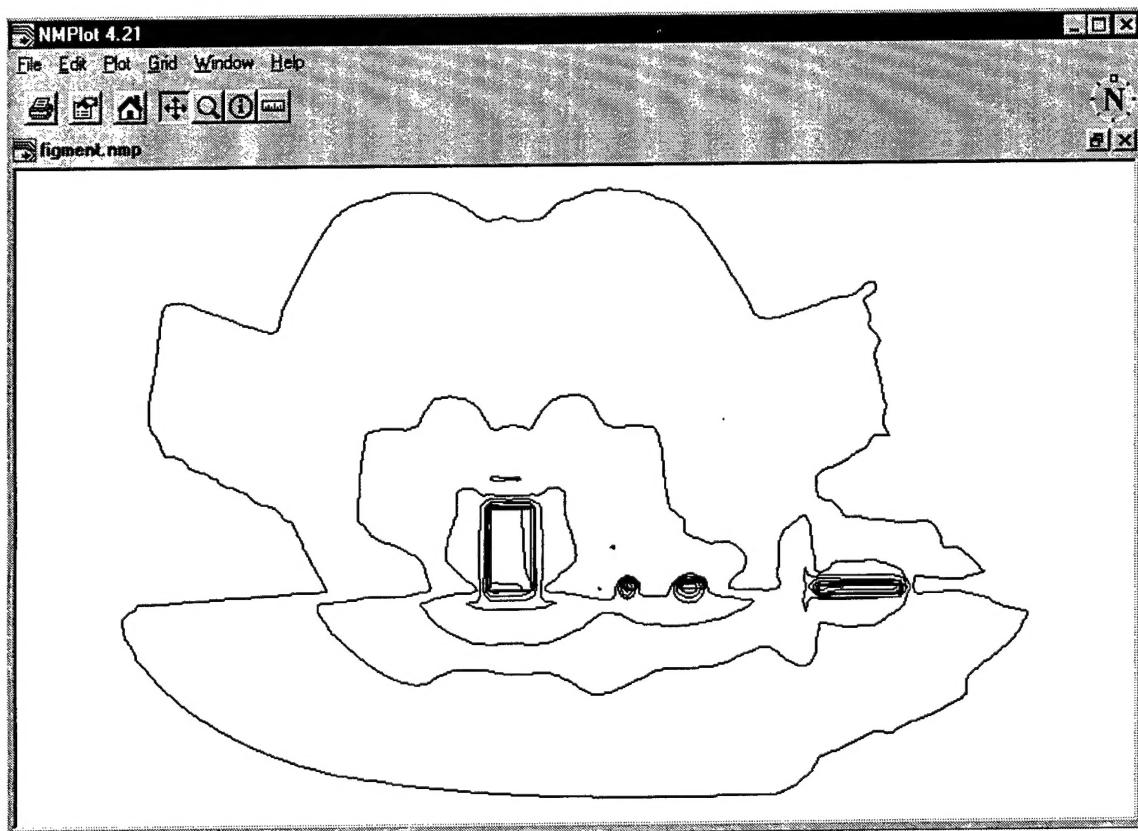
NMPlot Figment.nmp.

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